EFFECTIVENESS OF MODERATE MASSAGE THERAPY AND LIGHT MASSAGE THERAPY IN WEIGHT GAIN OF PRE TERM INFANTS – A Comparative Study

Dissertation submitted to

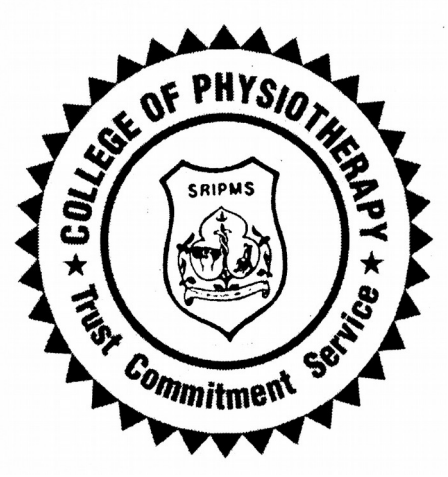
The Tamil Nadu Dr. M. G. R. Medical University

Chennai

In partial fulfillment of the requirements for the degree of

MASTER OF PHYSIOTHERAPY

(ADVANCED PHYSIOTHERAPY IN PEDIATRICS)



Reg . No. 2710109

APRIL - 2012

COLLEGE OF PHYSIOTHERAPY

SRI RAMAKRISHNA INSTITUTE OF PARAMEDICAL SCIENCES

COIMBATORE - 641 044.

CERTIFICATE

This is to certify that the dissertation work entitled **Effectiveness Of Moderate Massage Therapy And Light Massage Therapy In Weight Gain Of Pre Term Infants – A Comparative Study** was carried out by the candidate bearing the **Register No. 27101109 (April 2012)** in College of Physiotherapy, SRIPMS, Coimbatore, affiliated to The Tamilnadu Dr. M.G.R Medical University, Chennai towards partial fulfillment of the **Master of Physiotherapy** (Advanced Physiotherapy in Pediatrics).

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CERTIFICATE

This is to certify that the dissertation work entitled **Effectiveness Of Moderate Massage Therapy And Light Massage Therapy In Weight Gain Of Pre Term Infants – A Comparative Study** was carried out in College of Physiotherapy, SRIPMS, Coimbatore, affiliated to The Tamilnadu Dr. M.G.R Medical University, Chennai towards partial fulfillment of the **Master of Physiotherapy** (Advanced Physiotherapy in Paediatrics) under my direct supervision and guidance.

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CERTIFICATE

This is to certify that the dissertation work entitled **Effectiveness Of Moderate Massage Therapy And Light Massage Therapy In Weight Gain Of Pre Term Infants – A Comparative Study** Submitted By

REG . NO. 27101109

APRIL - 2012

To The Tamil Nadu Dr. M.G.R. Medical University, Chennai in Partial fulfillment of the requirement for the award of degree of **MASTER OF PHYSIOTHERAPY** was evaluated

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INTERNAL EXAMINER **EXTERNAL EXAMINER**

Place : Coimbatore
Date :

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CONTENTS

I INTRODUCTION

In humans preterm birth refers to the birth of a baby of less than 37 weeks gestational age. The medical definition that determines a 'preterm baby' from a 'miscarriage' (in Australia) is the baby being more than 20 weeks gestation and / or more than 400 grams in weight. The World Health Organization suggests 22 weeks and 500 grams in birth weight. Approximately 10 to 12 percent of Indian neonates are born before 37 completed weeks.

The cause for preterm birth is in many situations elusive and unknown; causes are mainly two types spontaneous and induced. In spontaneous main causes are ante partum hemorrhage, cervical incompetence, maternal disease, low maternal weight gain and malnutrition, multiple pregnancies and congenital malformations. The induced causes are maternal diabetes and severe heart diseases, unsatisfactory fetal growth, antepartum hemorrhage, fetal hypoxia and fetal distress.

Pre term infants mainly classified as three according to the week of gestation.

- From 32 to 37 weeks is regarded as ' mildly preterm'. Nearly 80% of preterm babies are born around 32 to 37 weeks gestation.

- From 28 to 31 weeks is regarded as 'moderately preterm'. About 11% of preterm babies will be born around 28 to 31 weeks gestation.
- Before 28 weeks is regarded as 'extremely preterm'. About 9% of preterm babies will be born less than 28 weeks gestation.

Premature infants are at greater risk for short and long term complications, including disabilities and impediments in growth and mental development.

Low birth weight babies are defined as birth weight of a live born infant of less than 2,500 g irrespective of the gestational age. At the population level the proportion of babies with LBW is an indicator of a multifaceted public health problem that includes long term maternal malnutrition. WHO estimated that globally about 17% of all live births are LBW babies. Main causes for low birth weight babies are pre term birth, young age of mother, multiple pregnancies, and poor nutrition of mother.

Low birth weight babies are mainly classified as

- Very low birth weight babies- babies with a birth weight of less than 1500 gm.

- Extremely low birth weight babies-Babies with a birth weight of less than 1000g.
- Small for dates babies- Babies with a birth weight of less than tenth percentile for their gestational age.

Infant massage was first introduced in China in 2nd century BC. Massaging the newborn has been a tradition in India and other Asian countries since time immemorial. Neonatal massage may help neonates reduce the stress levels and has been suggested to improve the growth and development of preterm and low birth weight infants. We reviewed the literature to look at the various techniques of providing massage, its benefits, possible mechanism of action and adverse effects. The review suggests that massage has several positive effects in terms of weight gain, better sleep-wake pattern, enhanced neuromotor development, better emotional bonding, and reduced rates of nosocomial infection and thereby, reduced mortality in the hospitalized patients.

According to Field et al, (1986) protocol in moderate massage therapy has 15 minutes. It contains three generalized five minute phases, the first and third was tactile phases and kinesthetic stimulation was in the middle.

The light pressure massage therapy also followed the same Field et al (1986) protocol. Techniques were same in light and moderate pressure massage therapy except in light pressure massage therapy contains light pressure stroking was used were used in the first and last sessions.

1.1 THE STUDY

In these study we compare preterm infant's weight gain after receiving moderate pressure massage therapy than those receiving light pressure massage therapy, the moderate pressure massage therapy group showed increased vagal activity and gastric motility. It also shows an increase in weight gain than light pressure massage therapy group.(Diego,Field & Hernandez-Reif 2005). Stimulation of pressure receptors gave the relaxed state of the baby, decreased heart

rate and enhanced vagal activity were due to stimulation of pressure receptors, and it also leads to the release the increased amount of food absorption hormones such as insulin (Field, 1988) and glucose and gastrin.

1.2 NEED OF THE STUDY

The aim of the study was to observe the changes in the behavioral states, weight gain and heart rate while receiving moderate and light pressure massage therapy.

The preterm infants were randomly assigned for the treatment. Behavioral observations were made from sleep/wake states of the baby and the heart rate and weight gain were also recorded before and during the therapy sessions.

1.3 STATEMENT OF THE PROBLEM

Since the effect of moderate versus light pressure massage therapy program in preterm infants is ambiguous, this study aims to evaluate CHANGE IN WEIGHT GAIN IN MODERATE VERSUS LIGHT PRESSURE MASSAGE THERAPY IN PRETERM INFANTS.

1.4 OBJECTIVES OF THE STUDY

1. A study about weight gain in preterm babies while receiving moderate and light pressure massage therapy.
2. The behavioral states and heart rate were recorded in preterm while receiving the treatment.

1.5 HYPOTHESIS

In the background of ambiguous knowledge about the weight gain in preterm babies while receiving moderate and light pressure massage therapy. it makes the research to be performed under the perspective of which could be:

NULL HYPOTHESIS

The null hypothesis upon which the study is designed can be stated as ‘There is no Significant Change in Weight Gain in Moderate Versus Light Pressure Massage Therapy in Preterm Infants’

II. REVIEW OF LITERATURE

- **Field T, Diego M, Hernandez-Reif M.** (2Ma010 y) Int J Neurosci. 2010 May; 120(5):381-5) stated that for effective massage therapy moderate pressure is essential. When comparing with light and moderate massage therapy studies shows that moderate massage therapy enhances growth and development than the other therapy in adults.
- **Ho YB, Lee RS, Chow CB, Pang MY** (2009 Sep 15.) Pediatr Int. 2010 Jun; 52(3):378-85. Epub 2009 Sep 15) defined that effect of massage therapy on motor outcomes in very low-birth weight infants**.** Massage therapy might be a workable involvement to promote motor outcomes in a subgroup of VLBW newborns with poor motor performance.
- **Lee HK** (2005 Dec) Taehan Kanho Hakhoe Chi. 2005 Dec; 35(8):1451-60). Stated that effect of infant massage on weight gain, physiological and behavioral responses in premature infants. This study showed that massage therapy might enhance optimal physiological responses and behavioral organization of premature infants.
- **Harold Jerome, Noronna Diego (2005 Jul.)** Acta Paediatr. 2007 Nov; 96(11):1588-91. Epub 2007 Sep 21). Stated that Vagal activity, gastric motility, and weight gain in massaged

preterm neonates. The weight gain experienced by preterm neonates receiving moderate-pressure massage therapy may be mediated by increased vagal activity and gastric motility.

- **Joshuwa Reif M, Derwin EK,** (2003 Sep.). Stated that stable preterm infants gained more weight and increased sleep after receiving five days of massage therapy. Healthy, low-risk preterm infants gained more weight and slept less with just 5 days of massage, in contrast to 10 days in previous studies.
- **Weller A, Ferber SG, Kuint J, Feldman R, Dollberg S, Arbel E, Kohelet D.** (Early Hum Dev. 2002 Apr;67(1-2):37-45.) stated that massage therapy by mothers and trained professionals promote weight in preterm infants.
- **Ohlsson A, Lacy JB, Horsley A**.(2000) Cochrane Database Syst Rev. 2004;(2):CD000390) Stated that for promoting growth and development of preterm infants, massage was the best technique. Evidence that massage for preterm infants are of benefit for developmental outcomes is weak and does not warrant wider use of preterm infant massage.
- **Miguel Diegoa, Tiffany Fielda, b, Maria Hernandez-Reifc** (5 February 2010) Infant Behav Dev. 2010 Apr; 33(2):115-24) stated that moderate massage therapy has promote weight in preterm infants. In treatment they included limb passive movements also. And bone density of babies also increased

- **Tiffany Field** (Neonatal Netw. 2003 May-Jun; 22(3):39-45. Review) stated that Massage Therapy Facilitates Weight Gain in Preterm Infants. Studies from several labs have documented a 31 to 47% greater weight gain in preterm new-born receiving massage therapy (three 15-min sessions for 5–10 days) compared with standard medical treatment.
- **Maria Hernandez-Reif, Miguel Diego, and Tiffany Field (**27 October 2005) the mothers who spent greater time with their neonates while giving moderate massage therapy shows drastic improves in weight gain and get better rank in brazelton scale.
- **Angela Underdown, Jane Barlow, Vincent Chung, Sarah Stewart-Brown** (21 JAN 2009) Cochrane Database Syst Rev. 2006 Oct 18;(4):CD005038) Stated that massage intervention helps to increase mental and physical health in infants aged under six months**.** The results of nine studies providing primary data suggest that infant massage has no effect on growth, but provides some evidence suggestive of improved mother-infant interaction, sleep and relaxation, reduced crying and a beneficial impact on a number of hormones controlling stress.
- **Lin Huang** (Pediatr Rev. 2003 Jan; 24(1):4-11. Review) states that critical review of massage therapy employed for newborns.

The practice of massage therapy promotes the development of preterm babies.

- **F. Narenji,N. Rosbahany,** (2003).states that the effects of massage therapy on weight gain and sleep behaviors in infants. Results from this study have shown that massage therapy could improve the sleep behaviors, weight gain and also length in infants. These positive effects on growth of infants may result from augmented of growth hormone release due to an increment in duration of the infants night sleep.
- **Ho, Yuen-bing** (2008) (J Pediatr. 2005 Nov; 147(5):579-85). states that the effects of massage therapy on weight gain, length of stay and motor development in preterm very low birth weight infants: a pilot randomized controlled trial. Massage therapy is relatively low risk, and it is a potential early intervention strategy to be introduced in local neonatal units to promote early developmental outcomes of the high risk infants.
- **Yuen-Bing Ho, Robert S.Y. Lee, Chun-Bong Chow, Marco Y.C. Pang** (15 SEP 2009, Pediatr Int. 2010 Jun;52(3):378-85. Epub 2009 Sep 15). States that impact of massage therapy on motor outcomes in very low-birth weight infants. Massage therapy might be a possible treatment to promote motor

outcomes in a subgroup of VLBW newborns with poor motor performance.

- **Procianoy RS, Mendes EW, Silveira RC**. (2010 Jan, Early Hum Dev. 2010 Jan;86(1):7-11. Epub 2009 Dec 22). States that massage therapy helps to increase neurodevelopmental outcomes at two years corrected age for very low birth weight infants.
- **Massaro AN, Hammad TA, Jazzo B, Aly H**. (2009 May J Perinatol. 2009 May;29(5):352-7. Epub 2009 Jan 15).states that massage with kinesthetic stimulation helps to improves weight in preterm infants. And massage with KS is a relatively simple and inexpensive intervention that can improve weight gain in selected preterm infants.

- **Lahat S, Mimouni FB, Ashbel G, Dollberg S.** (2007 Aug, J Am Coll Nutr. 2007 Aug; 26(4):356-9). States that energy expenditure in growing preterm infants receiving massage therapy. Energy expenditure is significantly lowered by 5 days of massage therapy in metabolically and thermally stable preterm infants. This decrease in energy expenditure may be in part responsible for the enhanced growth caused by massage therapy.

- **Hernandez-Reif M, Diego M, Field T**. (2007 Dec) Infant Behav Dev. 2007 Dec;30(4):557-61. Epub 2007 Jun 4) states that after 5 days of massage therapy preterm infants show less stress behaviors and activity.
- **Chang SM, Sung HC (2007 Feb**) (Hu Li Za Zhi. 2007 Feb; 54(1):78-82).states that application of massage therapy in premature infant nursing care. This article introduces massage therapy principles and methods, the effectiveness of massage therapy in premature infant care, and an approach to teaching parents how to apply massage therapy on their premature infants.

- **Arora J, Kumar A, Ramji S**. (2005 Nov; 42(11) Indian Pediatr. 2005 Nov;42(11):1092-100). states that effect of oil massage on growth and neuro behavior in very low birth weight preterm neonates. Oil application may have a potential to improve weight gain among preterm very low birth weight neonates.
- **Field T. (2002 Dec)** (Semin Neonatol. 2002 Dec; 7(6):487-94). states that preterm infant massage therapy studies: an American approach. Some studies have also shown length and head

circumference growth and bone mineral density increases associated with massage therapy.

- **Merino Navarro D, García Melchor M, Palomar Gallardo C, Cano López MC**.(Rev Enferm. 2002 Jun;25(6):12-4. Spanish.) States that massages and premature child care. To give children massages has gained wide use as a supplementary therapy and this practice steadily gains larger support since it provides great benefits to children who receive massages and to the relationship between parents and their children.
- **Becker PT, Thoman EB** (Physiol Behav. 1983 Oct;31(4):405-10) stated that Organization of sleeping and waking states in infants: consistency across contexts. Sleep states were analyzed separately for two contexts: infant alone and infant with the mother. States analyzed included Alert, Waking (Non-Alert) Activity, Fussing or Crying, Drowse or Sleep-Wake Transition, Active Sleep, Quiet Sleep, and Unclassified Sleep.
- **Thoman EB, Davis DH, Denenberg VH.** (Physiol Behav. 1987;41(6):531-7.) They studied about the study of the sleeping and waking states of infants was extended to the time domain by analyzing their temporal covariation over a 4-week interval using the intra-person correlation coefficient.

III. MATERIALS AND METHODOLOGY

3.1 PARTICIPANTS

Thirty preterm infants (Mean Gestational Age =32wks, Mean Birth Weight =1000 grams) were randomly assigned.

3.2 ASSESSMENT TOOLS USED

- Sleep-wake behaviors- Thoman's sleep state criteria
- Heart rate of baby during pre and post treatment
- Weight of the baby during pre and post treatment

3.3 MATERIALS

- Towel
- Data collection and recording sheet
- Pediatric balance beam scale for assessing body weight
- Stethoscope for assessing heart rate

3.4 METHODOLOGY

a. Study design

This is a study with two groups. One received moderate pressure massage therapy and other received light pressure massage therapy. The results were compared.

b. Study setting

The study was carried out in Newborn Intensive Care Unit (NICU), Sri Ramakrishna hospital, Coimbatore

c. Sampling technique

Convenient random sampling.

d. Sample size

30 pre-term infants were assigned into two groups of 15 each.

e. Study duration

The study was conducted for a period of four months.

f. Selection criteria

Inclusion criteria

- Gestational age between 28-32 weeks
- Their birth weight between 550-1800 gms
- Their NICU stay was 5-50 days
- Their current weight study entry between 1000 and 1900 gms
- They are medically stable
- They were not receive antibiotics and phototherapy

Exclusion criteria

- Exhibited genetic anomalies, congenital malformations and central nervous system dysfunctions
- Human Immuno deficiency Virus +ve
- Had history of maternal alcohol or drug or syphilis or hepatitis
- Birth weight above 2000gms
- Current birth weight study entry below 1000 and above 2000 gms.

h. Study design

Three treatment sessions of 15 minutes periods per day for five days were carried out for a period of 4 months.

i. Treatment duration

Three treatment sessions of 15 minutes period per day for five days.

j. Statistical analysis

Independent t test was used for comparing both groups. Dependent paired t test used for within groups

Equations independent t test and

$$t = \frac{\bar{x}_1 - \bar{x}_2}{S}\sqrt{\frac{n_1 n_2}{(n_1 + n_2)}}$$

$$S = \sqrt{\frac{\sum (x_1 - \bar{x}_1)^2 + \sum (x_2 - \bar{x}_2)^2}{n_1 + n_2 - 2}}$$

Where,

S = Combined Standard deviation.

X_1 = Difference between pretest and posttest in Group A

$\bar{x}_1$ = Mean difference of the Group A.

X_2 = Difference between pretest and posttest in Group B

$\bar{x}_2$ = Mean difference of the Group B.

n_1 = Number of patients in Group A

n_2 = Number of patients in Group B

Dependent t test

1. Dependent "t" test = $\dfrac{\sum d}{\sqrt{\dfrac{N\sum d^2 - \left(\sum d\right)^2}{N-1}}}$

   d = Difference between post test and pre test values.
   N = Number of patients.

2. Independent "t" test = $\dfrac{\bar{d}_1 - \bar{d}_2}{S}\sqrt{\dfrac{n_1 n_2}{n_1 + n_2}}$

$$S = \sqrt{\frac{\sum\left(d_1 - \bar{d}_1\right)^2 + \left(d_2 - \bar{d}_2\right)^2}{n_1 + n_2 - 2}}$$

$\bar{d}_1$ = mean difference between post and pre test values in Group I

$\bar{d}_2$ = mean difference between post and pre value in Group II

d_1 = Difference between post and pre value of Group I

d_2 = Difference between post and pre test value of Group II

n_1 = Number of patients in Group I

n_2 = Number of patients in Group II

S = Combined standard deviation

IV. TREATMENT TECHNIQUES

PROCEDURE

In this study massage was provided for three sessions for a period of 15-minute periods per day, it was given for five days.

The moderate pressure massage therapy was permitted for 15-minute per sessions. It consists of three standardized five-minute phases that was one tactile stimulation phase and two sessions of kinesthetic stimulation.

In the tactile stimulation phase the infant was placed in prone position and stroked with moderate pressure. Superficial stroking technique is a relaxation technique it consists of rhythmical linear movements of relaxed hand or a part thereof over the skin either direction that is proximal to distal or vice versa, without any pressure.

According to Field et al, (1986) massage protocol, the preterm babies were massaged for five to six, one-minute periods over each region in the following sequence:

- Head and face

Stroke the crown of the head with thumbs using circular movements. Then, with the fingertips stroke from head down along the sides of the face. Include the eyebrows, nose, cheeks, jaw bone and around the ears.

- Shoulders, arms and hands

Stoke across the shoulders, rounding them forward, and down the arms to the hands. Encircle the baby's arm from shoulder to wrist, then massage the baby's hands and fingers using therapist's thumb and fore finger.

- Chest and abdomen

Using both hands stroke the chest from the center following the line of the ribs to the side of the body. Abdominal discomfort may be relieved by using circular, clockwise strokes around the umbilicus.

- Legs, foot and ankles

Give long strokes along the legs from the thigh to toes on all surfaces, then massage by gently squeezing, as with the arms. Massage the ankles; then support the ankle and use the thumb to massage the sole of the foot firmly.

- Back

Starting from the neck, stroke down the back with a flat hand, then gently massage with the finger tips in a circular motion down either side of the spine to the buttocks. The baby may be prone or lying on one side.

- Buttocks

Jiggle the buttocks and use finger and thumb squeezing.

In the kinesthetic stimulation phase the baby's position was supine and alternate arms, then legs, and finally legs together were flexed and extended (as that was in a bicycling motion). This movement should be pain less and should last for 10 seconds of total of five, one-minute segments.

The light pressure massage followed the same Field et al (1986) protocol. The time and treatment arrangement of light pressure massage therapy were same as moderate pressure massage therapy except the light pressure stroking. That was used first and last five minutes of the treatment. The kinesthetic stimulation was in the middle and it persisted the same.

V. DATA PRESENTATION, ANALYSIS & INTERPRETATION

I WEIGHT OF THE BABY

MODERATE MASSAGE THERAPY

S. No	Pre test	Post test	d	$(d-\bar{d})$	$(d-\bar{d})^2$
1	1.63	1.72	-0.09	-0.058	0.0033

2	1.16	1.31	-0.15	0.002	0.000004
3	1.25	1.37	-0.12	0.028	0.00078
4	1.60	1.73	-0.13	0.018	0.00032
5	1.21	1.36	-0.15	0.002	0.000004
6	1.57	1.70	-0.13	0.018	0.00032
7	1.28	1.40	-0.12	0.028	0.00078
8	1.13	1.28	-0.15	0.002	0.000004
9	1.36	1.52	-0.16	0.012	0.000144
10	1.87	2.07	-0.20	0.052	0.00270
11	1.17	1.30	-0.13	0.018	0.00032
12	1.38	1.53	-0.15	0.002	0.000004
13	1.46	1.62	-0.16	0.012	0.000144
14	1.67	1.87	-0.20	0.052	0.00270
15	1.72	1.91	-0.19	0.042	0.00176

d = 2.23 $\quad \overline{d}$ = 0.1486
S = 0.03079 $\quad$ t = 18.05

LIGHT PRESSURE MASSAGE THERAPY

No	Pre test	Post test	d	(d-$\overline{d}$)	(d-$\overline{d}$)^2
1	1.25	1.28	-0.03	0.0033	0.000009
2	1.50	1.53	-0.03	0.0033	0.000009
3	1.18	1.20	-0.02	0.007	0.000049
4	1.02	1.05	-0.03	0.0033	0.000009

5	1.08	1.11	-0.03	0.0033	0.000009
6	1.47	1.50	-0.03	0.0033	0.000009
7	1.07	1.09	-0.02	0.007	0.000049
8	1.21	1.23	-0.02	0.007	0.000049
9	1.68	1.70	-0.02	0.007	0.000049
10	1.38	1.40	-0.02	0.007	0.000049
11	1.42	1.45	-0.03	0.0033	0.000009
12	1.59	1.61	-0.02	0.007	0.000049
13	1.48	1.51	-0.03	0.0033	0.000009
14	1.18	1.21	-0.03	0.0033	0.000009
15	1.06	1.10	-0.04	0.013	0.000169

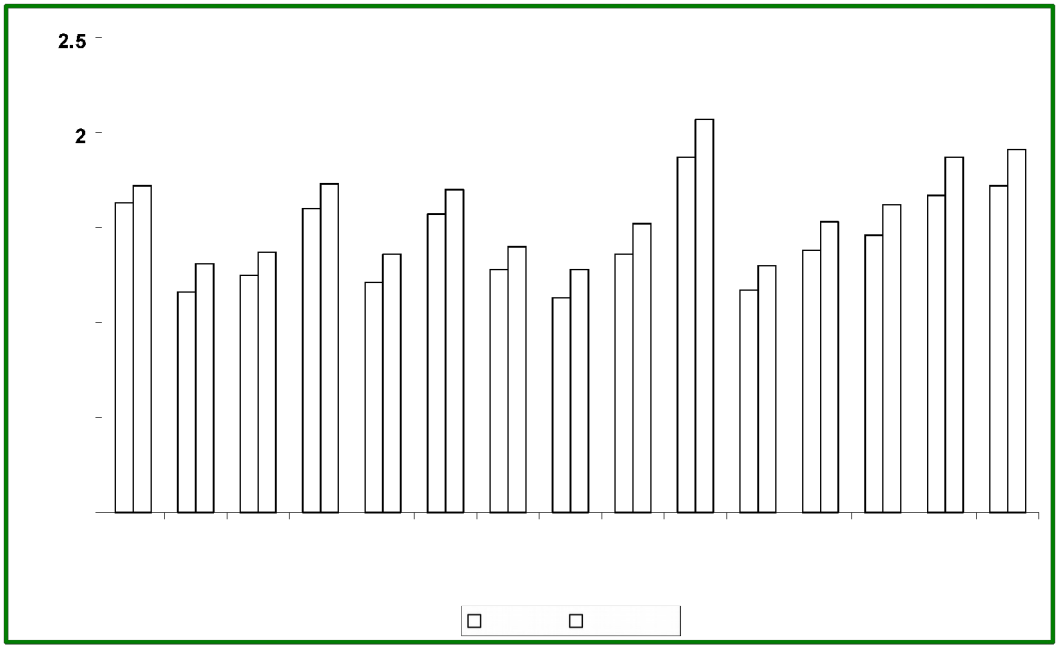
d = 0.4

$\overline{d}$ = 0.0267

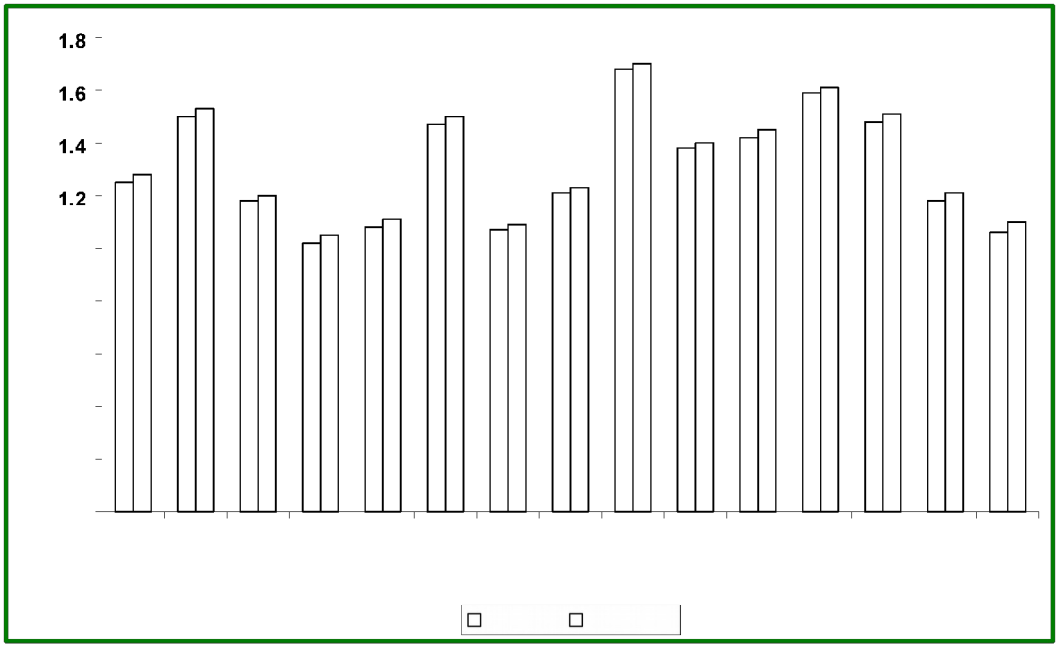
S = 0. 006181

t= 16.92

MODERATE MASSAGE THERAPY



LIGHT PRESSURE MASSAGE THERAPY



II. HEART RATE OF THE BABY

MODERATE PRESSURE THERAPY

S. No	Pre test	Post test	d	(d- $\bar{d}$)	(d- $\bar{d}$)^2
1	168	140	28	9.53	90.82
2	175	154	21	2.53	6.40
3	179	164	15	-3.47	12.04
4	138	129	9	-9.47	89.68
5	181	172	9	-9.47	89.68
6	166	152	14	-4.47	19.98
7	128	118	10	-8.47	71.74
8	155	138	17	-1.47	2.16
9	188	169	19	0.53	0.280
10	175	154	21	2.53	6.40
11	172	151	21	2.53	6.40
12	164	147	17	-1.47	2.16
13	193	162	31	12.53	157
14	163	141	22	3.53	12.46
15	144	121	23	4.53	20.520

d = 277
$\bar{d}$ = 18.47
S = 6.476
t =11.05

LIGHT PRESSURE MASSAGE THERAPY

S. No	Pre test	Post test	d	(d-$\bar{d}$)	(d-$\bar{d}$)^2
1	162	157	5	-5.13	26.31
2	171	162	9	-1.13	1.27
3	168	156	12	1.87	3.49
4	178	163	15	4.87	23.71
5	149	135	14	3.87	14.97
6	154	142	12	1.87	3.49
7	163	158	5	-5.13	26.31
8	138	123	15	4.87	23.71
9	129	118	11	0.87	0.756
10	149	137	12	1.87	3.49
11	164	156	8	-2.13	4.53
12	172	164	8	-2.13	4.53
13	181	173	8	-2.13	4.53
14	139	128	11	0.87	0.756
15	144	137	7	-3.13	9.79

d =152
$\bar{d}$ =10.13
S =3.2911
t=11.02

MODERATE PRESSURE THERAPY

LIGHT PRESSURE MASSAGE THERAPY

III. THOMAN'S SLEEP SCALE

MODERATE PRESSURE MASSAGE THERAPY

S. No	Pre test	Post test	d	(d- $\bar{d}$)	(d- $\bar{d}$)^2
1	6	3	3	-1.13	1.27
2	5	2	3	-1.13	1.27
3	7	3	4	-0.13	0.0169
4	4	1	3	-1.13	1.27
5	8	3	5	0.87	0.756
6	9	3	6	1.87	3.49
7	5	2	3	-1.13	1.27
8	6	3	3	-1.13	1.27
9	10	3	7	2.87	8.23
10	5	1	4	-0.13	0.0169
11	8	4	4	-0.13	0.0169
12	7	3	4	-0.13	0.0169
13	6	1	5	0.87	0.756
14	5	1	4	-0.13	0.0169
15	6	2	4	-0.13	0.0169

d=62
$\bar{d}$ =4.13
S=1.185
t=13.49

LIGHT PRESSURE MASSAGE THERAPY

S. No	Pre test	Post test	d	(d-$\bar{d}$)	(d-$\bar{d}$)^2
1	7	5	2	-0.47	0.220
2	9	7	2	-0.47	0.220
3	10	7	3	0.53	0.280
4	9	6	3	0.53	0.280
5	7	4	4	1.53	2.34
6	8	6	2	-0.47	0.220
7	6	4	2	-0.47	0.220
8	4	3	1	-1.47	2.16
9	10	7	3	0.53	0.280
10	7	5	2	-0.47	0.220
11	8	5	3	0.53	0.280
12	9	6	3	0.53	0.280
13	4	2	2	-0.47	0.220
14	8	6	2	-0.47	0.220
15	10	7	3	0.53	0.280

d=37

$\bar{d}$ =2.47

S=0.7425

t=12.88

MODERATE PRESSURE MASSAGE THERAPY

LIGHT PRESSURE MASSAGE THERAPY

BODY WEIGHT COMPARISON OF POST TESTS OF

MODERATE AND LIGHT PRESSURE MASSAGE THERAPY

No	Moderate pressure Massage therapy X_1	Light pressure massage therapy X_2	$(X_1-\overline{X_1})$	$(X_1-\overline{X_1})^2$	$(X_2-\overline{X_2})$	$(X_2-\overline{X_2})^2$
1	1.72	1.28	0.14	0.0196	0.05	0.0025
2	1.31	1.53	0.27	0.0729	0.2	0.04
3	1.37	1.20	0.21	0.0441	0.13	0.0169
4	1.73	1.05	0.15	0.0225	0.28	0.0784
5	1.36	1.11	0.22	0.0484	0.22	0.0484
6	1.70	1.50	0.12	0.0144	0.17	0.0289
7	1.40	1.09	0.18	0.0324	0.24	0.0576
8	1.28	1.23	0.3	0.09	0.1	0.01
9	1.52	1.70	0.06	0.0036	0.37	0.1369
10	2.07	1.40	0.49	0.2401	0.07	0.0049
11	1.30	1.45	-0.27	0.0784	0.12	0.0144
12	1.53	1.61	0.05	0.0025	0.28	0.0784
13	1.62	1.51	0.04	0.0016	0.18	0.0324
14	1.87	1.21	0.29	0.0841	0.12	0.0144
15	1.91	1.10	0.33	0.1089	0.23	0.0529

X_1 = 23.69

X_2 = 19.97

$\overline{X_1}$ = 1.58

$\overline{X_2}$ = 1.33

$$S = \sqrt{\frac{\sum (X_1 - X_2)^2 + \sum (X_2 - X_2)^2}{n_1 + n_2 - 2}}$$

S = 0.229

t value = 2.968

Tabulate t value at for 28 degrees of freedom at 5% level significance is 2.763

DATA ANALYSIS

Thirty pre term babies were assigned for treatment. They divided into two groups each group contain fifteen babies. One group received moderate massage therapy and other group received light pressure massage therapy. The outcomes were measured by three methods they were Thoman's sleep scale, body weight analysis, and heart rate analysis.

In this comparative study, the pre test and post test values obtained by using weight analysis, heart rate, Thoman's scale. For within group analysis using dependent paired t test. And for comparing both treatment group using independent t test.

Weight analysis of preterm babies for 28 degrees of freedom at 5% level significance is 2.763 and calculated t value is 2.968 so alternate hypotheses are accepted.

VI. DISCUSSION

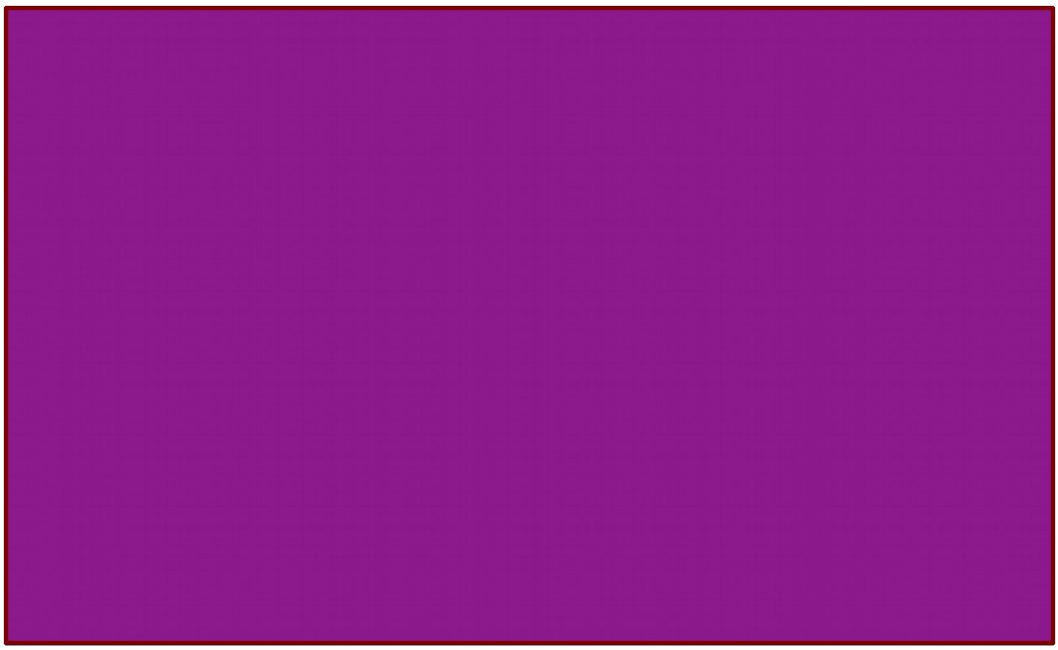
In this study the moderate pressure massage therapy group was gained more weight than the other massage therapy group. Many studies in preterm babies shows the same results, (Diego et al, 2004; Dieter, Field, Hernandez-Reif, Emory & Redzepi, 2003; Field et al, 1986) shows increased weight gain in preterm babies while receiving moderate massage therapy and full-term infants ,Field, Hernandez-Reif, Diego, Feijo, Vera & Gil 2004; Goldstein-Ferber, 2004; Moyer-Mileur, Brunstetter, McNaught, Gill & Chan, 2000.

Thirty pre term babies were assigned for treatment. They divided into two groups each group contain fifteen babies. One group received moderate massage therapy and other group received light pressure massage therapy. The outcomes were measured by three methods they were Thoman's sleep scale, body weight analysis, and heart rate analysis. Treatment duration was 5 days.

MEAN DIFFERENCE BETWEEN MODERATE PRESSURE MASSAGE THERAPY AND LIGHT PRESSURE MASSAGE THERAPY (WEIGHT OF THE BABY)

Groups	Mean	Standard deviation	Dependent paired t value
Moderate pressure massage therapy	0.1486	0.03079	18.05
Light pressure massage therapy	0.0267	0. 006181	16.92

MEAN DIFFERENCE BETWEEN MODERATE PRESSURE MASSAGE THERAPY AND LIGHT PRESSURE MASSAGE THERAPY (WEIGHT OF THE BABY)



MEAN DIFFERENCE BETWEEN MODERATE PRESSURE MASSAGE THERAPY AND LIGHT PRESSURE MASSAGE THERAPY (HEART RATE OF THE BABY)

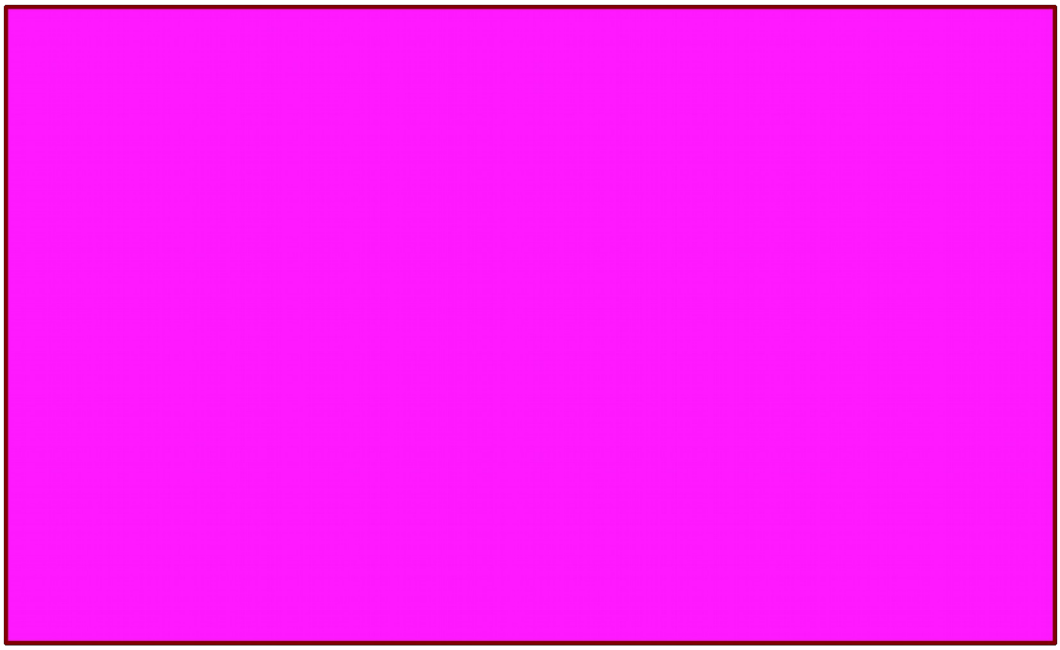
Groups	Mean	Standard deviation	Dependent paired t value
Moderate pressure massage therapy	18.47	6.476	11.05
Light pressure massage therapy	10.13	3.2911	11.02

MEAN DIFFERENCE BETWEEN MODERATE PRESSURE MASSAGE THERAPY AND LIGHT PRESSURE MASSAGE THERAPY (HEART RATE OF THE BABY)

MEAN DIFFERENCE BETWEEN MODERATE PRESSURE MASSAGE THERAPY AND LIGHT PRESSURE MASSAGE THERAPY (THOMAN'S SLEEP SCALE)

Groups	Mean	Standard deviation	Dependent paired t value
Moderate pressure massage therapy	4.13	1.185	13.49
Light pressure massage therapy	2.47	0.7425	12.88

MEAN DIFFERENCE BETWEEN MODERATE PRESSURE MASSAGE THERAPY AND LIGHT PRESSURE MASSAGE THERAPY (THOMAN'S SLEEP SCALE



ANALYSIS OF POST VALUES OF WEIGHT OF BOTH GROUPS

Groups	Mean	Standard deviation	Calculated t value	Table t value
Moderate pressure massage therapy	4.13	0.2299	2.968	2.763
Light pressure massage therapy	2.47			

The data from sleep scale and heart rate suggested the moderate pressure massage therapy group was very relaxed and less stressed than the light pressure massage therapy group. The more relaxed behavioral states and lower heart rate was the evidence for this.

Pre term infants with moderate massage therapy was more relaxed, not as much of active, during the treatment it leads to the greater weight gain, potentially by less energy expenditure.

According the statistical analysis, the heart rate and Thoman's sleep scale values were less in moderate massage therapy group than light pressure massage therapy. It shows that the moderate massage therapy group was more relaxed than the light massage therapy group. The dependent paired t tests for moderate massage therapy group was high than the light massage therapy grouped. In heart rate, moderate

massage therapy dependent paired t value was 11.05 and the t value for light massage therapy group was 11.02. About Thoman's sleep scale, the dependent paired t tests for moderate massage therapy group was 13.49 and light massage therapy group was 12.88.

When comparing the weight gain of babies in two groups independent t test was used. The calculated t value is greater than the tabulated t value. The calculated t value was 2.968 and the tabulated t value was 2.763 it shows there is significant change in weight gain in moderate versus light pressure massage therapy in preterm infants' thus the alternate hypothesis is accepted.

VII. CONCLUSION

According on the statistical analysis and review of literature, it has been clearly established that moderate pressure massage therapy is much more efficient than light pressure massage therapy for weight gain of pre-term infants.

From review literature, **Miguel Diegoa, Tiffany Fielda, b, Maria Hernandez-Reifc (5 February 2010)** stated that moderate massage therapy has promote weight in preterm infants. In treatment they included limb passive movements also. And bone density of babies also increased.

From statistical analysis the calculated t value is greater than the tabulated t value. The calculated t value was 2.968 and the tabulated t value was 2.763 it shows there is significant change in weight gain in moderate versus light pressure massage therapy in preterm infants' thus the alternate hypothesis is accepted and there is **"*significant difference in weight of preterm babies while giving moderate pressure massage therapy than light pressure massage therapy*"**

LIMITATIONS AND RECOMMENDATIONS

LIMITATION

- The study was time bound only.
- It has been done in small number of subjects.
- It included only pre term babies with 28-32 weeks of gestational age.
- Massage was the only treatment technique used in it.

RECOMMENDATIONS FOR FURTHER STUDY

- Further studies can be conduct for a larger sample size.
- Same type of studies can also be used with term babies.
- Along with the massage therapy other techniques like voijta and early stimulation therapy can be added for further studies.

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APPENDICES

APPENDIX I

NEONATAL ASSESSMENT CHART

- Name
- Age
- Gender
- Date of birth
- Address
- Ip/op no
- Head circumference
- Birth weight
- Chief complaints
- History

- Prenatal
- Natal
- Post natal
- Family history

ON OBSERVATION

- Supine

- Prone
- Sitting
- Standing

MILESTONES

- Social smile (2 months)
- Head holding (4 months)
- Follow with eyes (5 months)
- Rolling over (6 months)
- Crawling (7months)
- Sitting (8 months)
- Standing(12 months)
- Walking (15 months)

REFLEX EVALUATION

Neonatal reflexes

1) Spinal reflexes
- Lower limb placing (B-6weeks)
- Upper limb placing (B-6 weeks)
- Automatic walking (B-6 weeks)
- Flexor with drawl (28 weeks-2 mnths)
- Crossed extensor thrust (28 wks-2mnths)
- Sucking (B-7 mnths)
- Rooting (B-4mnths)
- Swallowing (B-7mnths)
- Moro's (28wks-5 mnths)
- Starle (B-persists)
- Palmar grasp (B-6mnths)
- Plantar grasp(28 wks-10 mnths)

2) Automatic reactions
- Landau's reflex (6mnths-15 mnths)
- Gallant's trunk incurvation (B- 3 yrs)

- Parachute reaction

3) Brainstem reflexes or tonic reflexes

- ATNR (B- 6 mths)
- STNR (4mnths-12 mnths)
- TLR (B-6 mnths)
- Positive supporting reactions (B- 6 mnths)
- Negative supporting reactions

4) Midbrain reactions or postural reflexes

- Optical righting (2mnths- persists)
- Labyrinthine (2mnths-persists)
- Body righting on body (4mnths-5yrs)
- Body righting on head (B-5yrs)
- Dolls eye(B-2wks)

5) Cortical reactions

- Balance and equilibrium

a. In prone (6mnths-persists)
b. In supine (7mnths-persists)
c. In sitting (7mnths-persists)
d. In standing (12 mnths-persists)

ON EXAMINATION

❖ APGAR SCORE

A	Appearance
P	Pulse rate
G	Grimace
A	Attitude of limb
R	Respiratory rate

Total score- 10

❖ Higher functions

- Hearing

- Vision
- Speech

❖ Motor assessment

➢ Tone

Right	Left
Upper limb	Upper limb
Lower limb	Lower limb

➢ Range of motion

Right	Left
Upper limb	Upper limb
Lower limb	Lower limb

➢ Reflexes

- Deep tendon reflexes

Right	Left
Upper limb	Upper limb
Lower limb	Lower limb

- Superficial reflexes

➢ Voluntary control

➢ Deformities/ contractures/ tightness

➢ Limb length discrepancy

- True length
- Apparent length

➢ Hand functions

Bowel and bladder functions

Associated handicap

Remarks

Physical therapy- Aims and Management

APPENDIX II

SLEEP WAKE BEHAVIORAL ASSESSMENT OF

PRETERM BABIES

New Thoman's scale 1990

Score	State
1	Quiet sleep
2	Active-quiet sleep
3	Active sleep
4	Sleep wake transition
5	Drowsy
6	Daze
7	Alert
8	Non alert waking
9	Fuss
10	Crying

APPENDIX III

TAKING WEIGHTS OF INFANTS

- Infants should be weighed on a pediatric balance-beam scale that is accurate to within 10 g (0.01 kg).
- Any cushion (for example, a towel or diaper) used in the pan either should be in place when the zero adjustments are made on the scale or (but not recommended) its weight should be subtracted from the infant's weight
- Infants are weighed nude or with minimum clothing.
- The average of two or three weighing is recorded numerically in the infant's file to the nearest 10 g (0.01 kg).
- Excessive infant movement can make it difficult to obtain an accurate weight, in which case the weighing can be deferred until later in the examination.

Low birth weight babies

Low birth weight babies are defined as birth weight of a live born infant of less than 2,500 g irrespective of the gestational age.

They mainly classified as

- Very low birth weight babies- babies with a birth weight of less than 1500 gm.
- Extremely low birth weight babies-Babies with a birth weight of less than 1000g.
- Small for dates babies- Babies with a birth weight of less than tenth percentile for their gestational age.

APPENDIX IV

PRETERM BABIES

Preterm baby is the baby being more than 20 weeks gestation and / or more than 400 grams in weight. According to World Health

Organization definition , preterm baby was below 22 weeks of gestational age and more than 500 grams in birth weight.

Pre term infants mainly classified as three according to the week of gestation.

- From 32 to 37 weeks is regarded as ' mildly preterm'. Nearly 80% of preterm babies are born around 32 to 37 weeks gestation.
- From 28 to 31 weeks is regarded as 'moderately preterm'. About 11% of preterm babies will be born around 28 to 31 weeks gestation.
- Before 28 weeks is regarded as 'extremely preterm'. About 9% of preterm babies will be born less than 28 weeks gestation.

APPENDIX V

HEART RATE

In general, the younger and smaller the child, the higher you would expect the heart rate to be. A newborn routinely has heart rates up to the 150s with no cause for concern.

Heart rate can assess by feeling her pulse on her wrist or foot, listening with a stethoscope, or using an electronic monitor.

Listed below are normal heart rates (beats per minute) by age. Note that these rates are for children who are resting. The heart rate may be higher during crying, and should be on the low end of the scale when sleeping.

Normal Heart Rates (Resting)

Age	**Normal Range (Resting)**
Premature	120-170
0-3 months	100-150
3-6 months	90-120
6-12 months	80-120
1-3 years	70-110
3-6 years	65-110